

## REMARKS

The last Office Action has been carefully considered.

It is noted that claims 1 and 2 are rejected under 35 U.S.C. § 102 over the patent to Kimura.

Claims 3 and 5 are rejected under 35 U.S.C. § 103 over the patent to Kimura in view of the patent to Bohmer.

Claim 6 is rejected under 35 U.S.C. § 103 over the patent to Kimura in view of the patent to Stiefel.

At the same time claim 4 is indicated as being generally in allowable condition.

The Examiner's indication of the allowability of claim 4 has been greatly acknowledged. In connection with this, this claim has been canceled and replaced with a new claim 7 which combines the features of the original claims 1, 3, and 4. It is believed that this claim should be considered as being in allowable condition.

After carefully considering the Examiner's grounds for the rejection of the claims over the art, applicants' have amended claim 1, the broadest claim on file, to more clearly distinguish the present invention over the references.

Turning now to the references and particularly to the patent to Kimura, it should be mentioned that first of all this reference deals with processing of the inner and outer surfaces of both pipes as clearly specified in the title of the invention, and only a limited deformability is provided. In contrast, in accordance with the applicants' invention, substantial cross-sectional changes must be performed with massive rolling product. Moreover, the rollers in the reference are supported at both sides, while in the applicants' invention they are supported floatingly. The main difference however is different shape of the rollers. In the Japanese reference the rollers have the shape of a drum or a barrel. In the applicants' invention the rollers have the shape of a cone or two oppositely located truncated cones. The applicants' invention deals exclusively with the arrangement with conical rollers and is limited to such an arrangement, and therefore the arrangement with the rollers of different shape in the patent to Kimura is completely different, non analogous and can not be compared with the applicants' arrangement.

The conical shape of the rollers is defined indirectly in claim 1 by defining the angle. An angle of inclination defined in claim 1 leads positively to a conical form of the rollers. The angle enclosed between the axes 3 and 4 can be clearly seen in Figures 2, 4, 5, 6 of the drawings. This inclination angle is shown in the submitted copy of Figure 2 of the Kimura reference and identified as " $\alpha$ ". It can be clearly seen there that the inclination angle  $\alpha$  always and positively leads to a conical shape and with it, no shapes disclose in the reference are possible. The inclination angle  $\alpha$  is not provided in the Kimura reference as can be clearly seen from Figure 2 showing the longitudinal section. The rollers 36 have their roller axes which extend parallel to the longitudinal axis of the rolling product and are not inclined to it. Therefore, the rollers can and must have here a drum. The provision of an inclination angle  $\alpha$ , as in the applicants' invention, guarantees that the rollers have the shape of a cone. Claim 1 therefore defines only such an arrangement in which the roller axes are inclined relative to the longitudinal axis of the rolling product at an inclination angle  $\alpha$  and the rollers therefore have a conical shape.

With respect to Figure 1 of this reference, the Examiner is possibly of an opinion that there the rollers 36 are also inclined relative to the longitudinal axis of the rolling product. While this is true, however there is a different angle in this reference, namely a so called feeding angle which

is identified as  $\beta$ . These angles are completely different and not interchangeable. How to distinguish which of these angles is the case? This angle can be identified when I consider the corresponding angle by observing the rolling product. The feeding angle  $\beta$  provides a feed of the rolling product in the longitudinal direction. The inclined position of the roller 36 in Figure 1 of the reference is clearly the angle which produces a feed of the rolling product. In other words, in the reference there is an inclined position of the roller 36 at a feeding angle  $\beta$ . Without the feeding angle  $\beta$  the rolling product will not move through the arrangement and no continuous rolling process is possible. An inclination angle  $\alpha$  is not provided in the reference. The inclination reference angle  $\alpha$  does not produce any feed of the rolling product. This can be clearly seen in Figure 2 of the reference DE-OS 16 02 153. When considering this reference, only the inclination angle can be seen and it can be recognized that with rotatable roller 27 it turns the rolling product only about its longitudinal axis but does not displace the rolling product axially. Therefore, the angle  $\alpha$  shown in this reference is an inclination angle. This is how the angles distinguish from one another.

It is however to be understood that the rolling product must be moved through the arrangement or in other words a feed must be provided, since otherwise no production is possible and the arrangement is not useable. Therefore, in the references and the publications as well as in the

inventive arrangement, the rollers must be arranged inclined under a feeding angle  $\beta$ . That is why the rolling mechanism is identified as inclined rolling stand. All inclined rolling mechanisms and all arrangements for inclined rolling are provided with the feeding angle  $\beta$ , which is characteristics for this arrangement and do not have to be even mentioned. This is why in the original claim 1 the feeding angle  $\beta$  was not specifically defined.

“Arrangements for inclined rolling” are provided in different types. For example there are arrangements in which the rollers rotate about the rolling product plus which is true for all patented processes. There is a further type of the arrangement, in which in addition to the feeding angle  $\beta$  also an inclination angle  $\alpha$  is provided, or in other words the arrangement with both angles. Only the inventive arrangement falls under this category as clearly defined now in claim 1. The patent to Kimura does not belong to this type since, as mentioned above, there is no inclination angle  $\alpha$ . The U.S. patent to Stiefel also does not belong to this type, and therefore the construction disclosed in the German reference ‘153 is the closest prior art. In this reference, in addition to the inclination angle  $\alpha$  shown in the enclosed copy, also a feeding angle  $\beta$  is provided which however can not be seen in Figure 2 since it is located in a plane which extends perpendicular to the plane of the paper and extends in a longitudinal direction through the roller axis 36, so that the feeding angle  $\beta$  can not be shown in this view. The

German reference '153 does not have another view. The roller axis 36 extends not parallel to the plane of the paper, but is inclined to it by a not shown always available feeding angle  $\beta$ . Finally, the German reference '153 has both angles as the arrangement in accordance with the applicants' invention.

The present invention deals only with such arrangements for inclined rolling and with the rollers which rotate around themselves and around the rolling product, in which in addition to the available feeding angle  $\beta$ , also the inclination angle  $\alpha$  and therefore the conical as well as floatingly supported rollers are provided. In such arrangements the roller axes are inclined simultaneously in two directions to the longitudinal axis of the rolling product. The rollers must be driven through the roller shafts and there roller axes. If they are arranged inclined in two directions relative to the longitudinal axis of the rolling product, then it is especially difficult to transfer the torque of the drive from the sun gear which surrounds the longitudinal axis of the product, to the roller shaft. A good solution is proposed for this in the applicants' invention. The roller axes which are inclined only in one direction, as in the patent to Kimura logically can not provide any solution for this problem and therefore the feature disclosed in the reference can not be considered as pertinent or anticipating the new features of the proposed solution of the applicants' invention.

Before the priority date of the present application, a solution was found which however was not satisfactory. In the German reference '153 there is a solution which for producing the feeding angle  $\beta$  which is not visible in Figure 2. The roller carrier 31 is somewhat rotated relative to the planetary housing 30 about an axis of the intermediate gear 34 as shown in red in the enclosed copy, which axis is also the axis of the lower bevel gear 35. The upper bevel gear 35 rolls on the lower bevel gear 35 and remains in engagement with it. Both bevel gears 35 have a normal bevel gear toothing. With the strict problems with the upper bevel gear 35 acting as a drive gear are avoided. However, there is great disadvantage which is explained and 8 of the applicants' invention which is not eliminated in this reference.

The arguments presented with respect to the German reference '153 are completely applicable for the U.S. patent 4,587,820. There the lower bevel gear is identified with reference numeral 7 and the upper bevel gear or the drive gear is identified with reference numeral 8. It is the same type of the arrangement. The patent owner is the assignee of the application of the German reference '153.

In the Japanese reference '910 the problem underlying the applicants' invention does not exist, since the second angle or the inclination

angle  $\alpha$  is not present here. The drive gear 40 is inclined there only in one direction, that simplifies the toothing. The drive gear engages with a sun gear 41, but because of the only one angle, in the sun gear there is only a normal straight inner toothing and on the drive gear a matching crown toothing is used. Therefore, the bevel-gear toothing on the drive gear and on the sun gear as in the applicants' invention and in particular as defined in claim 1, is not provided here. Solution proposed in the reference can not be utilized in the arrangement in accordance with the applicants' invention which has the additional inclination angle  $\alpha$ . Therefore, the present invention provides a new solution.

This new solution is defined now in the amended claim 1.

When compared with the construction disclosed in the Japanese reference '910, the arrangement in accordance with the applicants' invention has the following new features as defined in claim 1:

- the rollers are bevel-shaped;
- the rollers are supported floatingly;
- the roller axes are inclined to the longitudinal axis of the rolling product not only at a feeding angle, but additionally at an inclination angle;



- the sun gear has a toothing on its outer side;
- the sun gear and the drive gears have an axis-offset bevel-gear toothings;
- the drive gears engage outwardly with the sun gear.

The combination of these features with the remaining features is the undoubtedly new.

It is therefore respectfully submitted that claim 1 as amended should be considered as patentably distinguishing over the art and should be allowed.

Claim 2 was rejected over the patent to Kimura as well. While the feature of claim 2 is disclosed in this reference, it is used in the arrangement of totally different type. In the arrangement with the features of claim 1, in particular in the arrangement with an additional inclination angle, this feature is new.

Claims 5 and 6 together with the features of claim 1 define the arrangement which is not disclosed in the references as well.

It is therefore believed to be clear that the solution disclosed in the patent to Kimura has nothing to do with the applicants' invention and can not be transferred to the arrangement of the applicants' invention. With the crown gear 40 of the reference, which engages only at an inner side with a sun gear 41 having a completely normal inner toothing with straight teeth, a roller axes which is inclined under a feeding angle and an inclination angle to the longitudinal axis of the rolling product is not driven. A person skilled in the art who familiarizes with this solution, would definitely not use this known solution in the present arrangement. A new solution has to be found. It can not be used in an arrangement of different type as in the patent to Kimura which has only a feeding angle and drum-shaped rollers. The U.S. patent '820 and in the German reference '153 only disadvantageous solutions are proposed with a plurality of intermediate gears and great sizes. The utilization of the axis-offset bevel gears as interengaging sun gear and drive gear is not disclosed in any of the references. The inventive solution is neither mentioned nor can be derived from the references.

Naturally, it is easy to say that the present invention can be considered as obvious from the references. However, such a statement can be made only with an unacceptable hindsight, or in other words when a person making such a statement familiarizes himself first with the teaching of the present invention. Subsequent parallels between the applicants'

invention and the references are found and remote similarities can be discussed from the publications related to arrangements of totally different arts; however, the critical issue is whether the similarities are recognizable for a person skilled in the art before the solution proposed by the present invention and when actually a person skilled in the art would arrive at new features of the present invention from the teachings of the references. While it seems that simple means for achieving the corresponding solutions can seem very close to the prior art, such simple means and simple solutions are especially difficult to find and they are very efficient and inventive.

As stated for example in re: in re: Arani and Moedrtzer, '166 U.S.P.Q. 24 in the decision of the Court of Customs and Patent Appeals:

"Obviousness must not be judged by hindsight; also, a little modification of a reference can be a most unobvious one."

The decision is clearly applicable to the applicants' invention. A person skilled in the art must determine which of the numerous features of the solutions in the prior art can be useable for the inventive solution and which are not. Also, a person skilled in the art must provide additional features which can not be derived from the references. Also, they have to be selected and their compatibility and usefulness or the corresponding arrangement has to be determined. Finally, it can not be obvious to arrive

exactly at the arrangement of the applicants' invention by selecting the corresponding features and assembling them in a specific inventive manner.

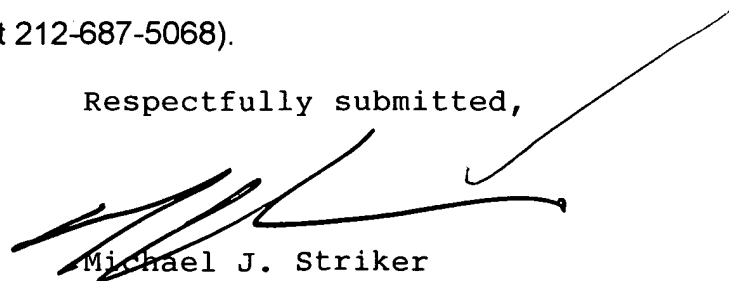
It is therefore respectfully submitted claim 1 should be considered as patentably distinguishing over the art and should be allowed.

As for the other claims, these claims depend on claim 1, they share its presumably allowable features and therefore it is respectfully submitted that these claims should be allowed as well.

Reconsideration and allowance of present application is most respectfully requested.

Should the Examiner require or consider it advisable that the specification, claims and/or drawings be further amended or corrected in formal respects in order to place this case in condition for final allowance, then it is respectfully requested that such amendments or corrections be carried out by Examiner's Amendment, and the case be passed to issue. Any costs involved should be charged to the deposit account of the undersigned (No. 19-4675). Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing this case to allowance, he is invited to telephone the undersigned (at 212-687-5068).

Respectfully submitted,



Michael J. Striker

FIG.2

